

NAV-2000

GLOBAL POSITIONING SYSTEM RECEIVER CHIPSET

SINGLE DSP, EIGHT-CHANNEL GPSR CHIPSET FOR SYSTEMS INTEGRATORS AND OEMS

The **NAV-2000**, is an 8-channel Global positioning System Receiver (GPSR) chipset, designed around a programmable platform, Analog Devices' SHARC™ DSP. The SHARC™ DSP is a 32-bit floating-point Digital Signal Processor (DSP) with on-chip SRAM and high I/O bandwidth.

The **NAV-2000** reference design consists of:

- SHARC™ Processor
- Boot memory EPROM (2MB)

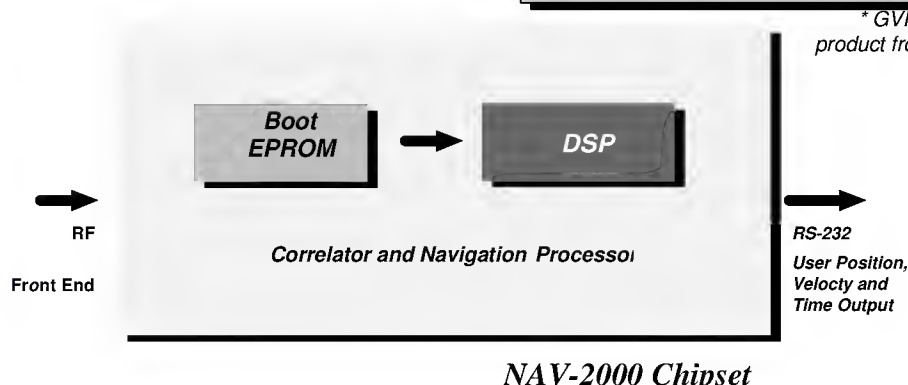
The NAV-2000, along with any standard RF front end and GPS antenna, makes a complete GPS receiver.

This receiver design consists of two major functional modules:

- Correlator
- Navigation Processor

HIGHLIGHTS

- Eight parallel channels
- Includes programmable SHARC™ DSP platform
- Adaptable to any standard RF front end
- Soft solution approach for correlation
- Efficient algorithms for very low time to first fix even without Almanac
- Very fast acquisition of GPS signals
- Computes user's position, velocity and time solution
- Provides navigation and guidance functions
- Real-time differential GPS compatibility
- Direct support for RS232 serial link
- Designed for easy customization of applications
- Easy upgradability and expandability
- Spare processing power for additional features and integrated applications
- Precise Time and Time Interval (PTTI) output
- Provided with powerful user interface software for PC-AT (GVISION*)



* GVISION is a GPSR user interface software product from Accord Software & Systems Pvt. Ltd.

CORRELATOR

The main functions of the included Correlator are:

- Parallel processing of eight channels
- Carrier frequency generation
- C/A code generation for 32 satellites
- Acquisition of carrier frequency and code phase
- Correlation of On-time and Dither samples
- Interface to Navigation Processor
- Self test

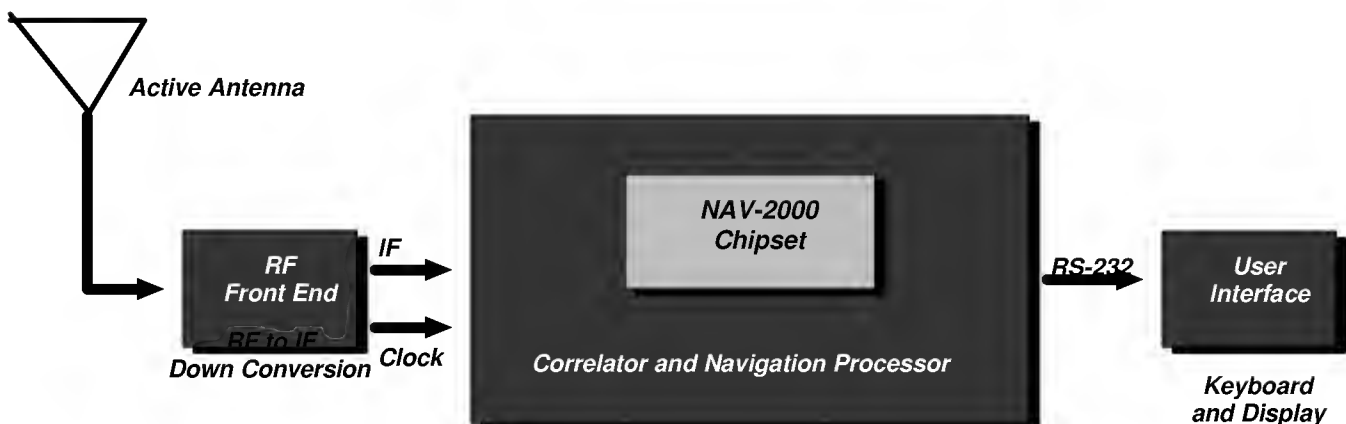
NAV-2000 — AN IDEAL BUILDING BLOCK FOR OEM APPLICATIONS

The NAV-2000, with its programmatic interface and the enormous 120M FLOPS processing power, forms an ideal building block for versatile OEM applications. This approach minimizes the additional processing hardware requirements for integrated GPS-based OEM applications resulting in a cost-effective end product.

- Measurement of pseudo range
- Interface with Correlator
- Extraction of navigation messages
- Satellite database management
- Satellite selection for position solution
- Computation of Position, Velocity and Time
- Non-volatile memory for storing Almanac, Ephemeris and Position data
- Host communications

NAV-2000-BASED GPS RECEIVER

ADI's reference GPS Receiver design based on the ADI NAV-2000 chipset, uses GEC Plessey's® GP2010 RF front end and commercially available active GPS antenna ANP-C-114-5 from M/ACOM. GVISION, user interface software which runs on PC-AT, provides information such as user's position, velocity, heading both in text and graphic form overlayed on map display.



GPS Receiver based on NAV-2000 Chipset

NAVIGATION PROCESSOR

The main functions of the included Navigation processor are :

NAV-2000 REFERENCE DESIGN BOARD

ADI's NAV-2000 Reference Design Board —Rev 2.0 has following specifications.

GENERAL CHARACTERISTICS

- Eight C/A Code Correlation Channels
- Processes GPS L1 Signal @ 1575.42 MHz
- Carrier Aided Tracking
- Fast Acquisition Techniques
- Real Time Executive-based Software Architecture
- All In View Solution
- NMEA0183 Compatible Message Format for Host Communication
- Uses the Accord Software And Systems (PUT.LTD) Custom Binary Message Format for Host Communication
- Real-Time Differential GPS Compatibility
- Precise Time and Time Interval (PTTI) Output

PERFORMANCE CHARACTERISTICS

Time to First Fix

- With almanac, position and time estimate: 45 sec. typical
- With almanac, position, time, ephemeris: 20 sec. typical
- Without almanac, time, position: 90 sec. typical

Position Accuracy

- Less than 30 meters with CEP 50% (without S/A)
- Less than 50 meters with CEP 90% (without S/A)

Dynamics

- Velocity 100 m/sec
- Acceleration 4g
- Jerk 5m/sec³

Acquisition

- Less than 24 seconds (without aid)
- Less than 16 seconds (with aid)

Re-acquisition

- 2-3 seconds typical

Satellite Data Collection

- 1.8 seconds to 6.8 seconds for synchronisation
- Continuous data collection and parity checking on all eight channels

Position Solution

- 2D/3D position, velocity and time
- 47 geodetic datum supported (default WGS84)

APPLICATION INTERFACE

The Real Time Executive of the ADI NAV-2000 provides a programmatic interface to integrate OEM application software.

PC HOST COMMUNICATION

- Interface RS232 compatible
- Baud Rate 9600 baud
- Message Format NMEA0183 Version 2.00
ASCII custom binary output HEX

OUTPUT MESSAGES

Users present position Latitude, Longitude, Height, ECEF coordinates, Velocity, Heading, Time, Channel information, DOP, Error estimate, Satellite used for last fix, Receiver status, Satellite data, Error messages, Signal strength, Almanac, Ephemeris, Satellite health status.

INPUT MESSAGES

Force satellite re-selection, Master reset, Override satellite health, Almanac, Position, Time and Date.

ELECTRICAL CHARACTERISTICS

- Power Supply
Voltage +5V $\pm 0.25V$
- Power Consumption 2.5 watts (approximate)

PHYSICAL CHARACTERISTICS

- Dimensions 80mm x 93mm x 20mm
- Connectors RF signal input through SMA jack
2 pin power supply connector

ENVIRONMENTAL CHARACTERISTICS

- Ambient Temp. -10°C to +85°C
- Humidity 95% non condensing
+30°C to +60°C
- Altitude 18,000 meters

The ADI NAV-2000 evaluation kit consist of:

Item No.	Description
1.	NAV-2000 reference design board - Rev 2.0 with DC-DC converter (input = +9V to +16V, output = +5V) housed in an enclosure.
2.	Antenna (ANP-C-114-5 from M/ACOM)
3.	Antenna cable (3 meters long) with SMA connectors at both ends and RS-232 cable.
4.	GVISION user interface software on a 3 1/2" floppy diskette
5.	NAV-2000 User Manual.

Analog Devices, Inc., together with *Accord Software & Systems Pvt. Ltd.* is developing the most advanced system receiver solutions today. *Accord* is based in Bangalore, India.

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